

Name:	<i>Fire Behavior and Combustion</i>
Course Description:	This course explores the theories and fundamentals of how and why fires start, spread, and how they are controlled.
Prerequisite:	None.
Outcomes:	<ol style="list-style-type: none"> 1. Identify physical properties of the three states of matter. 2. Categorize the components of fire. 3. Recall the physical and chemical properties of fire. 4. Describe and apply the process of burning. 5. Define and use basic terms and concepts associated with the chemistry and dynamics of fire. 6. Describe the dynamics of fire. 7. Discuss various materials and their relationship to fires as fuel. 8. Demonstrate knowledge of the characteristics of water as a fire suppression agent. 9. Articulate other suppression agents and strategies. 10. Compare other methods and techniques of fire extinguishments.
Suggested Student Texts:	<i>NFPA Handbook</i> (CD-ROM licensing agreement available) <i>Principles of Fire Protection Chemistry and Physics</i> ; Raymond Friedman, NFPA, 3 rd Ed., 1998 <i>Principles of Fire Behavior</i> ; James Quintiere, Thomson, 1 st Ed., 1997
Supporting References/Research for Faculty and Students:	U.S. Fire Administration <u>Publications:</u> http://www.usfa.fema.gov/applications/publications/pubs_main.cfm See Arson, Fire Protection, Wildfire <u>Applied Research:</u> http://www.usfa.fema.gov/dhtml/inside-usfa/research.cfm <u>Research Reports:</u> http://www.usfa.fema.gov/dhtml/inside-usfa/r_reports.cfm <u>Technical Reports:</u> http://www.usfa.fema.gov/applications/publications/techreps.cfm <u>Topical Fire Research Series:</u> http://www.usfa.fema.gov/dhtml/inside-usfa/tfrs.cfm

Supporting References/Research for Faculty and Students:	<p><u>Learning Resource Center:</u> http://www.usfa.fema.gov/dhtml/inside-usfa/lrc.cfm</p> <p>National Institute for Standards and Technology http://www.fire.nist.gov: See Fire Tests/Data, Software/Models, Publications, FIREDOC (under Publications)</p> <p>References http://www.interfire.org/ <u>Society of Fire Protection Engineers:</u> http://www.pentoncmg.com/sfpe/index.html</p> <p>Current Events/News http://www.firehouse.com/ http://www.fireengineering.com/ http://www.withthecommand.com/</p>
Assessment:	<p>Students will be evaluated for mastery of learning objectives by methods of evaluation to be determined by the instructor.</p>
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Course Outline

Fire Behavior and Combustion

- I. Introduction
 - A. Matter and Energy
 - B. The Atom and its Parts
 - C. Chemical Symbols
 - D. Molecules
 - E. Energy and Work
 - F. Forms of Energy
 - G. Transformation of Energy
 - H. Laws of Energy
- II. Units of Measurements
 - A. International (SI) Systems of Measurement
 - B. English Units of Measurement
- III. Chemical Reactions
 - A. Physical States of Matter
 - B. Compounds and Mixtures
 - C. Solutions and Solvents
 - D. Process of Reactions
- IV. Fire and the Physical World
 - A. Characteristics of Fire
 - B. Characteristics of Solids
 - C. Characteristics of Liquids
 - D. Characteristics of Gases
- V. Heat and its Effects
 - A. Production and Measurement of Heat
 - B. Different Kinds of Heat
- VI. Properties of Solids Materials
 - A. Common Combustible Solids
 - B. Plastic and Polymers
 - C. Combustible Metals
 - D. Combustible Dust
- VII. Common Flammable Liquids and Gases
 - A. General Properties of Gases
 - B. The Gas Laws
 - C. Classification of Gases
 - D. Compressed Gases

VIII. Fire Behavior

- A. Stages of Fire
- B. Fire Phenomena
 - 1. Flashover
 - 2. Backdraft
 - 3. Rollover
 - 4. Flameover
- C. Fire Plumes

IX. Fire Extinguishment

- A. The Combustion Process
- B. The Character of Flame
- C. Fire Extinguishment

X. Extinguishing Agents

- A. Water
- B. Foams and Wetting Agents
- C. Inert Gas Extinguishing Agents
- D. Halogenated Extinguishing Agents
- E. Dry Chemical Extinguishing Agents
- F. Dry Powder Extinguishing Agents

XI. Hazards By Classification Types

- A. Hazards of Explosives
- B. Hazards of Compressed and Liquefied Gases
- C. Hazards of Flammable and Combustible Liquids
- D. Hazards of Flammable Solids
- E. Hazards of Oxidizing Agents
- F. Hazards of Poisons
- G. Hazards of Radioactive Substances
- H. Hazards of Corrosives